Plan of Action (POA) for Scour Critical Bridges and Bridges with Unknown Foundations Scope of Work (SOW)

Scope Date: February 9, 2010
Region: HQ
Project No: TBD
Location: Statewide
Sub Account: TBD

The Contract Administrator for this Task Order will be:

Senior State Hydraulics Engineer: A. Mommandi
Address: CDOT
4201 East. Arkansas Ave. Suite 290
Denver, CO 80222
Phone: 303-757-9044

General Requirements:

Definitions

Engineer CDOT Hydraulics Engineer
Consultant Any personnel provided under this agreement to perform Plan of Action (POA) for Scour Critical Bridges and Bridges with Unkown Foundations

Work Duration

The time period for the work described in this scope of work covers the period from July 31, 2010, to July 31, 2011(Not to exceed term of contract).

Authorization to Proceed

Work shall not commence until the Contract Administrator transmits to the consultant the written Notice to Proceed and the work shall be completed in the time specified.

Routine Billing & Reporting

The consultant shall provide the following on a regular basis:

- Monthly billing reports in formats suitable to the Contract Administrator for all contract activities performed by the Consultant's personnel authorized to perform work on this project.
- Periodic reports and billings required by CDOT Procedural Directive 400.2.

Status of Contract

The Consultant shall monitor the fiscal status of the contract, and advise the CDOT Contract Administrator of any potential need for supplementing their contract. Failure to monitor contract status and provide timely notification may result in discontinuation of the Consultants services.

General Work Description

The Consultant will review the followig documents to become thorougly familiar with FHWA requirements and guidance for “Scour Critical Bridges Plan of Action Program”.

1. FHWA October 28, 1991 “Evaluating Scour at Bridges Technical Advisory” T5140.23.
2. FHWA National Bridge Inventory (NBI) regulations 23CFR 650, Subpart 650.313 (e) (3) enacted April1, 2008.
3. FHWA 2006 Drainage Review of CDOT and subsequent Staff Bridge NBIS reviews.

4. FHWA Mr. King Gee's January 4, 2008, " National Bridge Inspection Standards Scour Evaluations and Plan of Action for Scour Critical Bridges"
5. FHWA Mr. King Gee's January 9, 2008, " Technical Guidance for Bridges over Waterways with Unknown Foundations"
6. HEC-23 Publication No. FHWA-NHI-09-11 Vol. 1&2, September 2009 "Bridge Scour & Stream Instability Countermeasures"
7. HEC-18 Publication No. FHWA-NHI-01-001 "Evaluating Scour at Bridges"
8. HEC-20 Publication No. FHWA-NHI-01-002 "Stream Stability at Highway Structures"

The consultant will perform the following tasks and prepare work schedule which will include but will not be limited to the followings:

1. Set up Kick off meeting with CDOT HQ POA Team. Set up separate meetings with Regions POA Team (includes Hydraulics, maintenance and Environmental personnel)
2. Review CDOT latest list of scour critical bridges and bridges with unknown foundations provided by CDOT Bridge Branch/Staff Hydraulic.
3. Review structures folders prepared by Staff Bridges for all bridges.
4. Reassess the NBI Item 113 coding and determine if a bridge is scour critical (item 113 codes 0 through 3) or has an unknown foundation (item 113 code U).
5. Prioritize the statewide list of CDOT scour critical bridges and bridges with unknown foundation based on risk level. Consider the following factors for establishing risk level.

    - Functional classification
        i. Principal Arterial (Interstate)
        ii. Principal Arterial (Freeways or Expressways)
        iii. Other principal Arterial
        iv. Minor Arterial
        v. Major Collector
        vi. Minor collector
    - AADT
    - Detour length should the structure be closed
    - Age of structure
    - Condition of structure
    - Waterway adequacy
    - Schedule for replacing the bridge
    - Known active scour v. potential for scour
    - Emergency Service route or access
    - Evacuation Route
    - Route to airport

6. Review and update the FHWA standard form for "Scour Critical Bridge-Plan of Action" and tailor it to Colorado. If consultant can propose any modification of the FHWA form for Scour Critical Bridges so that it would help CDOT POA process be more efficient and cost effective, then consultant should suggest the proposed modification to Staff Hydraulics for approval. This form needs to be completed for each scour critical bridge and be part of the bridge drainage report for each site.
7. Arrange site inspection by a team of Hydraulics, Material, Maintenance, bridge, Environmental and FHWA.
8. Based on site inspections, review, update and re-prioritize (if necessary) the statewide list of CDOT scour critical bridges and bridges with unknown foundation as was prepared in item # 5 above.
9. Prepare a drainage report on every bridge on the list of CDOT scour critical bridges and bridges with unknown foundations. The report will –as a minimum—include the followings:
    I. TABLE OF CONTENTS
        i. Executive Summary
        ii. Bridge and Channel Description
        iii. Location Map
        iv. Hydrology Analysis
        v. Hydraulic Analysis
        vi. Geology Report Review
        vii. Stream Stability

viii. Scour Analysis
ix. Bridge Pier Scour Protection Design
x. Bridge Abutment Slope Protection Design
xi. Summary and Recommendations
xii. References Used

II. LIST OF FIGURES AND PHOTOS
i. Project Location Map
ii. Drainage Basin Map
iii. Bendway Weirs Design, if applicable
iv. Revetment Detail Sheet, if applicable
v. Looking toward the structure entrance
vi. Looking toward the structure outlet
vii. Looking toward the stream upstream from the structure
viii. Looking toward the stream downstream from the structure
ix. Roadway looking toward increasing roadway station

III. LIST OF TABLES
i. Hydrology—Peak Flow Summary Sheet
ii. Hydraulic Analysis Summary Sheet
iii. Bendway Weirs Detail Sheet, if applicable

IV. APPENDICES
i. Hydrology
ii. Hydraulic Calculation
iii. HEC-RAS Analysis
iv. Riprap Design Calculations
v. Miscellaneous

V. Consultant needs to consider the following items in the analysis and reporting:
i. Perform hydrology analysis and calculations for 2, 5, 10, 25, 50, 100, 250 and 500 year flood frequencies.
ii. Use gauge data and regression equations at each site for hydrologic calculation if available. If gauge data is not available, use StreamStats wherever applicable.
iii. Use applicable information from any existing FEMA or COE studies for any bridge site.
iv. Use at least 4 cross sections across the channel (2 upstream and 2 downstream) in the HEC-RAS analysis to calculated abutment scour, pier scour, contraction scour and total scour.
v. Identify Water surface Elevation (WSE) for the above mentioned flood frequencies at upstream face of the bridge pier/abutments
vi. Evaluate scour countermeasure options for the scour critical bridges. Identify options appropriate for the level of risk and present a recommended option using the following steps:
1. Consider hydraulic, geotechnical and structural methods plus scour level monitoring procedures in any countermeasure assessment. Some bridge sites may need a combination of these methods and procedures. In scour monitoring procedures consider the use of automated systems using fixed instrumentation.
2. Refer to FHWA's Hydraulic Engineering Circular 23 (HEC-23), Chapter 7 for Guidance on Scour Monitoring and Instrumentation.
3. Prepare detailed design and itemized cost estimates for the recommended scour countermeasure option. Cost estimates should not only include the cost of countermeasure design and construction but also the cost of structural inspection and scour monitoring.
vii. Complete FHWA standard form "Scour Critical Bridge—Plan of Action". This form is available to download from the following website:
http://www.fhwa.dot.gov/engineering/hydraulics/bridgehyd/poaform.doc

VI. All reports shall be in electronic format and hard copies. The drainage reports shall include input and output files for HEC-RAS analysis for each structure.

10. Abide by the following reporting requirements:
I. Prepare and send monthly progress report to Staff Hydraulics
II. Prepare and send quarterly summary progress report to Staff Hydraulics
III. Complete and send all final reports for all the bridges on the list by the end of June 2013.